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(21) International Application Number: PCT/DK91/00357 (22) International Filing Date: 27 November 1991 (27.11.91) (71) Applicant: MILLIKEN DENMARK A/S [DK/DK]; DK-8544 Mørke (DK). (72) Inventor: LANG, Aage ; Bygmarken 37, DK-8560 Kolind (DK). (74) Agent: LINDS PATENTBUREAU; Ellekrattet 20, DK-2950 Vedbæk (DK). (81) Designated States: AT, AU, BB, BG, BR, CA, CH, CS, DE, ES, FI, HU, JP, KP, KR, LK, LU, MC, MG, MW, NL, NO, PL, RO, SD, SE, SU, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LU, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).		Published <i>With international search report.</i>
(54) Title: TUFTED CARPET OR MAT PRODUCT (57) Abstract <p>A tufted carpet or mat product comprises a primary support fabric having an underside and an upper side, a layer of rubber or synthetic rubber adhered e.g. by vulcanization to the underside of the primary support fabric, and yarn nops extending through the primary support fabric for forming of a nap on the upper side of the primary support fabric and for forming of nap bottom parts between the rubber layer and the primary support fabric. In said tufted product the nap comprises 70-95, preferably 80 weight per cent animal wool and 5-30, preferably 20 weight per cent synthetic fibers, such as fibers of acryl, fluorocarbons, polyacetals, polyamides, polyesters, polyethylenes, polypropylenes, polyurethanes and similar fibers being relatively fire inhibiting, the primary support fabric material consists of fibers which per se has a high ignition point, and the rubber layer has been selected from the group of washable rubbers not being fire supporting and which preferably also are resistant against oils, gasoline, acids and bases. Thereby a tufted product is achieved which has a hitherto unknown self-extinguishing or fire inhibiting effect and which is washable after use and dirt and water binding during use.</p>		

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TUFTED CARPET OR MAT PRODUCT.

The present invention relates to a tufted carpet or mat product comprising a primary support fabric having an underside and an upper side, a layer of rubber or synthetic rubber which has been adhered, e.g. by vulcanization, to the underside of the primary support fabric, and yarn nops extending through the primary support fabric for forming of a nap on the upper side of the primary support fabric and for forming nap nop bottom parts between the rubber layer and the primary support fabric.

For a long time it has been known for mats and carpets to use a nap of inflammable natural fibres, such as cotton fibres, and it is also known to use synthetic polymeric inflammable fibres, such as cellulose fibres, acrylic fibres, polyester fibers, nylon fibers and polypropylene fibres for the manufacture of nap materials.

Attempts have been made in order to make such nap materials less inflammable or self-extinguishing, however, with no appreciable success. Although the treatment with the known fire inhibiting agents are reducing the inflammability, the treated mats and carpets expose certain undesired properties, such as the emission of unfavourable vapours by intense heat. The most undesired effect is, however, that said fire inhibiting agents are removed from the mats or carpets in question, when said carpets or mats are exposed to washing procedures, and this involves further finishing treatment of the mats or carpets after the washing operation. In this connection it should be mentioned that the receivers of such washed mats or carpets do not have any visible guarantee for the products having been impregnated with fire inhibiting agents. Unfortunately, this does not appear until the product in question has been exposed to a fire test or a fire accident. Consequently, on places where a fire could have disastrous consequences, it is not possible to be sure that the products are really fire inhibiting properties, which are only based on the fact that they have been impregnated with fire inhibiting agents.

hibiting impregnation agents, since promises on the presence of such agents may cause a false feeling of security.

Consequently, it is the purpose of the present invention to provide a new tufted carpet or mat product which is not provided with flame and fire inhibiting chemicals in the nap, but which per se is self-extinguishing and can pass the so-called California firetest, and which also fulfill the conditions for being called a washable dirt and liquid binding service product of the carpet or mat type for floor covering.

Said purpose is achieved with a tufted carpet or mat product according to the invention, wherein the nap comprises 70-95, preferably 80 weight per cent animal wool, and 5-30, preferably 20 weight per cent synthetic fibres, such as fibres of acryl, fluorocarbons, polyacetals, polyamides, polyesters, polyethylenes, polypropylenes, polyurethanes and similar fibers being relatively fire inhibiting, and the material of the primary support fabric consists of fibers which per se have a high ignition point, and the rubber layer is selected from the group of washable rubbers not being flame supporting and which preferably also are resistant against oils, gasoline, acids and bases. Thereby it has surprisingly turned out that for mat and carpet products a hitherto unknown self-extinguishing or fire inhibiting effect may be obtained when using a hitherto unknown combination of otherwise well known and often used materials.

A mat according to the invention has turned out to pass the mentioned California fire test IN ACC W.FAR 25.853 (b), and furthermore it turned out that a carpet or a mat according to the invention in spite of the large quantity of animal wool is water and dirt binding, and said properties are maintained even after several washing processes of the mat with intermediate periods of use where the mat is used in heavily trafficked locations. The mat is therefore well suited as water and dirt binding material.

covering material in areas, such as escape ways, where it is very important that such floor covering materials do not promote the spreading of fire.

One of the reasons for not earlier having used animal wool for water and dirt binding floor covering materials is presumably the inherent capability of the wool to reject water and dirt. However, by composing the wool of animal wool and not-flame-promoting synthetic fibres in a weight share of from 2,3:1 to 19:1, preferably 5:1, it has as mentioned above turned out that a floor covering material is achieved which beyond being fire inhibiting also is washable and dirt and water binding.

The primary support fabric material preferably comprises a layer of woven or non-woven fiber having an area weight of from 90 to 130, preferably 110 g/square meter, selected from the group of fibers which are fire inhibiting, such as acryl, fluorocarbons, polyacrylates, polyamides, polyesters, polyethylenes, polypropylenes, polyurethanes etc.

The primary support fabric and the part of the nap, viz. the nap top bottom parts, which e.g. by a needle technique are needled through the primary support fabric, are in a preferred embodiment partly vulcanized into the layer of natural or synthetic rubber.

The rubber layer is in a preferred embodiment of the kind being fire inhibiting and resistant against acids, bases, gasoline and mineral oils, at least to the same extent as nitrile butadiene rubber.

The rubber layer is in a preferred embodiment selected from the group of rubbers consisting of nitrile butadiene rubbers, butadiene acryl nitriles, polychlorophrenes, chlorosulphonated polyethylenes, ethylene/acryl elastomers, perfluoroelastomers, fluoroelastomers, polyesterelastomers, urethane rubbers and polysiloxane polymers.

The carpet or mat product according to the invention is suitable for use in escape ways in hotels and means of transportation, such as in

crafts, ships, trains and buses, partly because the product has passed the above fire test, and partly because the material is washable after use and dirt and water binding during use.

5 As an example of a carpet or mat product according to the invention may be mentioned a product, the nap of which is composed of 70% wool and 30% 80/20 polyamide or nylon, said nap by a needle technique has been tufted into a primary support fabric of polypropylene having an area
10 weight of 110 g/square meter, whereupon the primary support fabric with the nap was partly vulcanized into a bottom of fire inhibiting washable rubber on nitrile basis. Said product passed said fire test without containing any flame or fire inhibiting additives in the nap, and it had a high
15 dirt and water binding ability during use and was washable several times with a great number of intermediate periods of use.

C L A I M S :

1. A tufted carpet or mat product comprising a primary support fabric having an underside and an upper side, a layer of rubber or synthetic rubber adhered thereto, e.g. by vulcanizing to the underside of the primary support fabric, and yarn nops extending through the primary support fabric for forming of a nap on the upper side of the primary support fabric and for forming of nap nop bottom parts between the rubber layer and the primary support fabric, characterized in that the nap comprises 70-95, preferably 80 weight per cent animal wool and 5-30, preferably 20 weight per cent synthetic fibres, such as fibers of acryl, fluorocarbons, polyacetals, polyamides, polyesters, polyethylenes, polypropylenes, polyurethanes and similar fibers being relatively fire inhibiting, the material, cf. the primary support fabric consists of fibers which per se has a high ignition point, and the rubber layer is selected from the group of washable rubbers being ant flame supporting and which preferably also are resistant against oils, gasoline, acids and bases.

2. Tufted product according to claim 1, characterized in that the primary support fabric material comprises a layer of woven or non woven fiber having an area weight from 90-130, preferably 110 g/square meter and selected from the group of fibers being fire inhibiting, such as acryl, fluorocarbons, polyacetals, polyamides, polyesters, polyethylenes, polypropylenes, polyurethanes.

3. Tufted product according to claim 1, characterized in that the part of the nap, viz. the nap nop bottom parts, which e.g. by a needle technique has been needled through layer of natural or synthetic rubber.

4. Tufted product according to claim 1, characterized in that the rubber layer is fire inhibiting and resistant against acids, bases, gasoline and mineral oils, at least to the same extent as nitrile butadiene rubber.
- 5 5. Tufted product according to claim 1, characterized in that the rubber layer is selected from the group of rubbers consisting of nitrile butadiene rubbers, butadiene acryl nitriles, polychlorophrenes, chlorosulphonated polyethylenes, ethylene/acryl elastomers, perfluoro elastomers, 10 fluoroelastomers, polyesterelastomers, urethane rubbers and polysiloxan polymers.

INTERNATIONAL SEARCH REPORT

International Application No PCT/DK 91/00357

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: A 47 G 27/02, D 05 C 17/02																	
II. FIELDS SEARCHED <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched⁷</div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%; padding: 5px;">Classification System</td> <td style="padding: 5px;">Classification Symbols</td> </tr> <tr> <td style="padding: 5px;">IPC5</td> <td style="padding: 5px;">A 47 G; B 32 B; D 05 C</td> </tr> </table> <div style="text-align: center; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸</div> <p style="margin-top: 10px;">SE,DK,FI,NO classes as above</p>			Classification System	Classification Symbols	IPC5	A 47 G; B 32 B; D 05 C											
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III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%; padding: 5px;">Category *</th> <th style="width: 70%; padding: 5px;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 20%; padding: 5px;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">GB, A, 1475978 (WILLIAM WHARTON SEWARD) 10 June 1977, see the whole document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4513042 (LUMB) 23 April 1985, see column 2, line 57 - line 65 --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4064298 (SCHWARTZ ET AL) 20 December 1977, see the whole document --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">GB, A, 1527622 (PETER SMITH ASSOCIATES (CARPET IMPORTERS) LIMITED) 4 October 1978, see page 1, line 23 - line 49 --</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	A	GB, A, 1475978 (WILLIAM WHARTON SEWARD) 10 June 1977, see the whole document --	1	A	US, A, 4513042 (LUMB) 23 April 1985, see column 2, line 57 - line 65 --	1	A	US, A, 4064298 (SCHWARTZ ET AL) 20 December 1977, see the whole document --	1	A	GB, A, 1527622 (PETER SMITH ASSOCIATES (CARPET IMPORTERS) LIMITED) 4 October 1978, see page 1, line 23 - line 49 --	1
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents:¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>																	
IV. CERTIFICATION <div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 45%;"> <p style="font-size: small;">Date of Actual Completion of Search</p> <p style="text-align: center; margin-top: 10px;">992</p> </div> <div style="width: 45%;"> <p style="font-size: small;">Date of Issuance of International Search Report</p> <p style="text-align: center; margin-top: 10px;">992 07- 07</p> </div> </div> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr> <td style="width: 50%; padding: 5px; vertical-align: bottom;"> International Searching Authority <div style="text-align: center; font-weight: bold;">SWEDISH PATENT OFFICE</div> </td> <td style="width: 50%; padding: 5px; vertical-align: bottom;"> Signature of Authorized Officer <div style="text-align: center;">Herman Phalén</div> </td> </tr> </table>			International Searching Authority <div style="text-align: center; font-weight: bold;">SWEDISH PATENT OFFICE</div>	Signature of Authorized Officer <div style="text-align: center;">Herman Phalén</div>													
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		Relevant to Claim No
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	
E	GB, A, 2245285 (MILLIKEN DENMARK A/S) 2 January 1992, see claims 1-14 --- -----	1-5

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. PCT/DK 91/00357**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the Swedish Patent Office EDP file on 29/05/92. The Swedish Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB-A- 1475978	77-06-10	NONE	
US-A- 4513042	85-04-23	NONE	
US-A- 4064298	77-12-20	NONE	
GB-A- 1527622	78-10-04	BE-A- 843291	76-10-18
		CA-A- 1052082	79-04-10
		DE-A-B-C 2626777	77-01-20
		FR-A-B- 2315557	77-01-21
		LU-A- 75215	77-02-17
		NL-A- 7606831	76-12-28
		US-A- 4045605	77-08-30
GB-A- 2245285	92-01-02	NONE	